



TWRS-P PROJECT  
HAZARD ANALYSIS REPORT  
BNFL-5193-HAR-01, Rev. 1

**APPENDIX E**  
**PART A HAR SIGNIFICANT AND BOUNDING**  
**HAZARD EVALUATIONS**



## APPENDIX E PART A HAR SIGNIFICANT AND BOUNDING HAZARD EVALUATIONS

### 1.0 INTRODUCTION

This appendix identifies the changes to the significant and bounding hazard evaluations that have occurred since approval of Revision 0 of the Part A *Hazard Analysis Report* (HAR) as a result of design changes and of hazard evaluations conducted during Integrated Safety Management (ISM) Cycles I and II.<sup>1</sup> In some cases, new hazards are identified. Also, the consequences of some hazard evaluations have increased.

By RU letter 99-RU-0338 (dated June 10, 1999), the RU approved the authorization basis amendment request for the ISMP to state that only the parts of the HAR that address significant or bounding hazard evaluations are considered a part of the authorization basis.

### 2.0 IDENTIFICATION OF SIGNIFICANT AND BOUNDING HAZARD EVALUATIONS IN THE PART A HAR

This section describes the process used to identify the significant and bounding hazards and hazardous situations in the Part A HAR.

#### 2.1 HAR Rev. 0 Identification Process

The significant and bounding hazards were derived from the relevant portions of the *Hazard Analysis Report*, Rev. 0, and the *Initial Safety Analysis Report*, Rev. 0, as summarized below.

1. ISAR section 4.7, "Results of the Integrated Safety Analysis," and ISAR Appendix 1A, "BNFL Overall Safety Approach," Table 3-3, "Identified Hazards and Part A Controls," were reviewed for the significant and bounding hazards that had been identified in the HAR.
2. Chapter 6 of the HAR, as revised October 16, 1997 (BNFL letter #5193-97-0511), was reviewed to identify additional significant and bounding hazards. Chapter 6 presents the events that resulted from sorting the fault schedule database for those events assigned worker or public consequence categories greater than 2.
3. HAR Table 4-1 was reviewed to develop a list of the radioactive streams that represent a significant or bounding hazard to the facility.
4. HAR Tables 4-2, 4-3 and 4-4 were reviewed to develop a list of the chemicals and their byproducts that represent a significant hazard to the facility.
5. HAR Table 4-5 was reviewed to develop a list of the energy sources that represent a significant hazard to the facility.
6. The fault schedules in Chapter 5 and Appendices A and B of the HAR were reviewed to add to, or revise, the bounding or significant hazards not identified in Steps 1 – 5. The "Worker Consequence" and "Public Consequence" columns of the fault schedules aided in the identification of the significant and bounding hazards. However, since many of the fault schedules were based upon the event being mitigated, the events were re-evaluated to determine the potential unmitigated consequences.

<sup>1</sup> Integrated Safety Management (ISM) is BNFL Inc.'s application of the process for establishing a set of radiological, nuclear and process safety standards and requirements in accordance with DOE/RL-96-0004, Rev. 1, and RL/REG-98-17, Rev. 1, as set forth in SRD Vol. II, Appendix A. ISM Cycles I and II refer to the first two iterations of the ISM process during Part B-1.



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The following sections of the Part A HAR do not include information defining significant or bounding hazards and, thus, are not part of the AB:

- Chapter 1.0, Introduction
- Section 2.0, Facility Description
- Section 2.1, Site Description
- Section 2.2 Facility Description
- Section 2.3, Process Description
- Chapter 3.0, Hazard Analysis Methodology
- Section 4.1, Hazardous and Radioactive Materials (except for Tables 4-1, 4-2, and 4-3 discussed above)
- Section 4.2, Chemical Interactions (except for Table 4-4)
- Section 4.3, Energy Sources (except Table 4-5)
- Section 4.4 Comparison to Similar Facilities
- Section 5.1, Scope of Hazard Evaluation Studies
- Section 5.2, Process Steps, text descriptions
- Chapter 7.0, Items Requiring Future Study; Action Items
- Chapter 8.0, Management Response to Hazard Evaluation Study Issues
- Chapter 9.0, References
- Appendix D, Management Response Letter.

## **2.2 Identification of Changes to Significant and Bounding Hazard Evaluations in the Part A HAR**

During Part B-1, the hazard evaluation process continues to evolve. In accordance with DOE/RL-96-0004 (Reference 5), the hazard evaluation step of the Integrated Safety Management process is iterated due to changes in the identification of work (e.g., design changes), as well as due to feedback from the control strategy development and standards identification and confirmation steps. Thus, the new and changed significant and bounding hazards represent a natural evolution of the ISM process.

Changes to the significant and bounding hazard evaluations that have occurred since Rev. 0 of the Part A HAR were identified by a review of the results of ISM Cycles I and II. The HAR Rev. 0 significant and bounding events identified by the process described in section 2.1 were compared against the ISM Cycle II data to determine those hazards that constitute either new or changed significant and bounding hazards.<sup>2</sup>

## **2.3 Results**

Table E-1 identifies the changes to the significant and bounding hazard evaluations that have occurred since approval of the Part A HAR, Rev. 0.

## **3.0 REFERENCES**

1. BNFL-5193-ISP-01, Rev. 4b, November 9, 1999, *TWRS-P Integrated Safety Management Plan*, BNFL Inc., Richland, Washington.
2. Letter #99-RU-0338 from D. Clark Gibbs, DOE-RL Office of Radiological, Nuclear and Process Safety Regulation, to M. J. Lawrence, BNFL Inc., "Authorization Basis Amendment Request, ABAR-W375-99-0005," June 10, 1999, Richland, Washington (CCN # 004000).
3. BNFL-5193-HAR-01, Rev. 0, September 26, 1997, *Hazard Analysis Report*, BNFL Inc.,

<sup>2</sup> As of the date of this revision, the accident analysis and DBE identification efforts were in process.



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- Richland, Washington.
4. BNFL-5193-ISA-01, Rev. 0, January 12, 1998, *Initial Safety Analysis Report*, BNFL Inc., Richland, Washington.
  5. DOE/RL-96-0004, Revision 1, July 1998, *Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization*, U.S. Department of Energy, Richland, Washington.



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Table E- 1  
Changes to Significant and Bounding Hazard Evaluations

HAR Location	System	Event Description/Energy Source/Waste Stream	Comment
<b>Loss of Confinement (radioactive liquid release)</b>			
New evaluation	LAW Feed Receipt System	Overfilling or leaking of in-cell vessels	Potentially larger consequences than previously evaluated due to larger radioactive inventories associated with new LAW Feed Receipt Tanks.
See comment, New evaluation	N/A (Pretreatment process component being removed for maintenance)	Spill of process liquor onto C2 Pump & Valve Gallery.	Although the NOx hazard was recognized in the Part A HAR, it was not identified as a significant or bounding hazard; therefore, it has been included this ABAR.
New evaluation	Crane (Pretreatment)	Component drop onto process lines in C5 cell results in pipe break and liquid release.	
<b>Chemical Liquid Release or Mishandling</b>			
<b>Loss of Confinement (gas or particulate release)</b>			
New evaluation	HLW receipt vessels V12001 A-F	Overblow of PJM results in aerosol release to vessel vent.	
1614778/342	HLW cask handling equipment	Dropped cask with waste drum.	
<b>Fire</b>			
<b>Flammable Gas Fire/Explosion</b>			
New evaluation	PT Feed Receipt System	Radiolytic hydrogen fire/explosion; pump motor ignition source, static spark, etc.	Potentially larger consequences than previously evaluated due to larger radioactive inventories and tank void space associated with Feed Receipt Tanks. Hydrogen event is more energetic than previously evaluated.
1614666/122	HLW Concentrate Receipt Tanks (V31001/V31002)	Radiolytic hydrogen generation leading to fire/explosion	Hydrogen explosions were deemed incredible in Part A HAR, Rev. 0.
<b>Overpressure</b>			



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HAR Location	System	Event Description/Energy Source/Waste Stream	Comment
<b>Airborne Toxic Hazard</b>			
New evaluationSee comment.	LAW Melter Offgas	Overpressurization of melter and release of radioactive/toxic offgas into melter enclosure and leakage to occupied areas.	<u>Although the NO<sub>x</sub> hazard was recognized in the Part A HAR, it was not identified as a significant or bounding hazard; therefore, it is included herein.</u>
<b>Direct Radiation Hazard</b>			
1614776/295	Waste Storage Operations	Direct exposure due to improper placement of IHLW product canister in import tunnel	Consequences increased due to larger canister size.
<b>Energy Sources</b>			
<b>Major Radioactive Streams</b>			
Table 4-1	LAW Feed	The Envelope A, B, and C feed is stored in six, 1302 m <sup>3</sup> (operating capacity) receipt tanks.	Previously, one 225 m <sup>3</sup> tank.
Table 4-1	HLW Feed	The Envelope D feed is stored in a 312 m <sup>3</sup> receipt tank	Previously, a 225 m <sup>3</sup> tank.
Table 4-1	Sr/TRU Product	Stored in three tanks; one has an operating capacity of 312 m <sup>3</sup> , and other two each has an operating capacity of 86 m <sup>3</sup> .	Previously, one 150 m <sup>3</sup> tank.